Office of National Marine Sanctuaries/National Centers for Coastal Ocean Science Long-term Agreement (ONMS/NCCOS LTA)

2005 Annual Liaison Report on Existing and Potential ONMS/NCCOS Collaborative Studies at the Gulf of the Farallones National Marine Sanctuary (GFNMS)

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1. Introduction

In April 2000, the National Centers for Coastal Ocean Science (NCCOS) and the Office of National Marine Sanctuaries (ONMS) began a partnership with the purpose of augmenting the management of the National Marine Sanctuaries (NMS) through increased scientific understanding of the sanctuary sites. The first few years of the partnership saw NCCOS scientists working with a handful of sanctuaries. As the partnership matured, collaborative efforts between NCCOS and ONMS increased, and in FY2004 and FY2005, research projects are tentatively funded in 9 of the 14 sites. In addition to research, NCCOS has appointed liaisons to each of the sites. Liaison duties include: being knowledgeable of science activities and capabilities of NCCOS, being knowledgeable of the site's management needs, being knowledgeable of ongoing research and science needs in the site, identifying and assessing research gaps and areas of potential collaboration between NCCOS and ONMS, and working with the site to refine and address their science needs to meet their management objectives.

2. Sanctuary Overview

The National Marine Sanctuary Program was created by Congress through Title III of the Marine Protection, Research and Sanctuaries Act of 1972. The Act allowed marine areas identified for their biodiversity, ecological integrity, and cultural legacy to receive protection similar to national parks.

Gulf of the Farallones Marine Sanctuary (GFNMS) was established in 1981 to improve the protection of the marine environment and resources within the sanctuary. The sanctuary is currently managed through offices on the Presidio in San Francisco, California. The adjoining Cordell Bank National Marine Sanctuary (CBNMS) was formed in 1989 and managed through the GFNMS office until 1998. Although distinct, CBNMS continues to work closely with GFNMS to fulfill both sanctuaries' missions. GFNMS protects an area of 3252 km^2 off the northern California coast. The shoreward boundary extends along the coast from Rocky Point to Bodega Head. The sanctuary abuts the Point Reyes National Seashore

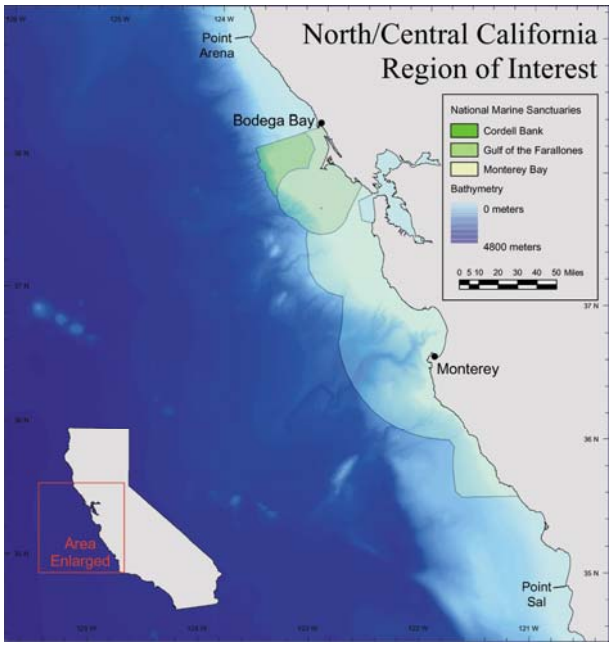

Figure 1. Map of north central California coast showing the boundaries of Cordell Bank National Marine Sanctuary, Gulf of the Farallones National Marine Sanctuary, and Monterey Bay National Marine Sanctuary.

along much of the shoreward boundary. In the northern portion, the offshore boundary abuts the inshore edge of CBNMS. In the southern portion, the offshore edge follows a 12 mile arc around the Farallone Islands. The southern boundary abuts the northern boundary of the Monterey Bay National Marine Sanctuary (MBNMS). A wide range of habitats are included in GFNMS. Rocky shorelines and estuarine areas occur along the shoreline. Estuarine areas include Bolinas Lagoon, Estero San Antonio, Estero de Americano, Tomales Bay, and Bodega Bay. Shelf areas include unconsolidated sediments of mud, fine sand, sand, and shell hash. Rocky outcrops are also found on the shelf and include submerged areas and emergent areas (Farallone Islands) on the outer shelf. The range of habitats within the sanctuary results in a rich and diverse community of plants and animals.

The area of the GFNMS was selected for protection largely based on the abundance of seabirds and aquatic birds, marine mammals, fish, marine plants, and benthic fauna. The 1987 management plan identified nesting seabird populations as the most significant resource of the sanctuary. Twelve of the sixteen species of marine birds known to breed along the U.S. Pacific coast have colonies on the Farallone Islands. In addition to seabirds, 123 species of aquatic birds have been recorded in the wetland areas of the sanctuary. Five species of seals and sea lions and seventeen species of whales, dolphins and porpoises are regularly observed in the sanctuary. Owing to the large variety of marine and estuarine habitats in GFNMS, there are also a wide diversity of fish and invertebrates species including Pacific salmon and Dungeness crab. Commercially important species are better known than non-commercial species, and the fish and invertebrate faunas from intertidal and nearshore areas are better documented than those from offshore areas.

Currently regulations prohibit: oil and gas exploration and development; vessel discharges, effluents from marine sanitation devices, fish wastes and bait; seabed alteration or construction, with the exception of anchoring, repair of breakwaters and jetties in Tomales Bay, installing navigation aids, and traditional fishing operations; oil tankers, barges, and other merchant vessels within two nautical miles of the Farallone Islands, Bolinas Lagoon, and Areas of Special Biological Significance; aircraft within one nautical mile of biologically sensitive areas must maintain an altitude of at least 1000 feet; damaging or removing historical or cultural resources; and Motorized Personal Watercraft (MPWC). California Fish and Game enforces federal as well as state fishing regulations in CBNMS. The U.S. Coast Guard has broad responsibility for enforcing all Federal laws in navigable waters under U.S. jurisdiction.

3. Update of NCCOS Projects for Central California

Remote Sensing Applications – This project will expand informal partnerships on environmental monitoring between the NCCOS Center for Coastal Monitoring and Assessment, Remote Sensing Team (CCMA-RST) and the Office of National Marine Sanctuaries (ONMS), to characterize physical, biological and water quality parameters in the Gulf of Farallones, Monterey Bay, and Cordell Bank sanctuary waters using satellite

data. The proposed work addresses several of the goals in the ONMS/NCCOS partnership, including priorities 1) Characterization of sanctuary resources; 2) Monitoring resource changes; and 4) providing biogeographic assessment information – a specialized topic which has been identified by the ONMS as particularly timely. The project will utilize an existing database of satellite data that has been produced by the CCMA-RST for coastal U.S. waters. Significant patterns in the temperature, chlorophyll and water quality fields and their variability will be characterized, and trends will be determined at various time-scales for each sanctuary studied. Data analysis and the final report was completed report in FY05. Final report, CD, and data are available (see citation below).

> R. Stumpf, S. Dunham, L. Ojanen, A. Richardson, T. Wynne, and K. Holderied, 2005. *Characterization and Monitoring of Temperature, Chlorophyll, and Light Availability Patterns in National Marine Sanctuary Waters: Final Report.* NOAA Technical Memorandum NOS NCCOS 13. NOAA/NOS/NCCOS/CCMA, Silver spring, MD. 48pp.

Biogeographic Assessment – A marine biogeographic assessment was conducted from 2001-2004 in the coastal ocean off North/Central California that encompasses the following three sanctuaries: Cordell Bank (CBNMS), Gulf of the Farallones (GFNMS), & Monterey Bay (MBNMS). Phase 1 of the project (FY01-04) was completed with four major products: 1) a literature-based ecological linkage report of the marine and estuarine ecosystems of central and northern California; 2) a biogeographic assessment using a GIS to identify important biological areas and time periods; 3) a summary folio of the overall assessment (in paper, web & PDF format), which includes highlights from the ecological report, the biogeographic assessment, and the integration of data to identify important biological areas; 4) a website of all final files and products. Phase 2 (FY04-05) was necessary to complete and update the bird and mammal assessments, which were not part of the initial assessment plan. Phase 2 focuses on updates to bird colonies and pinniped haulouts and rookeries, and an improved summary for mammals. CCMA conducted a biogeographic assessment of the northern California coast including GFNMS. The assessment identifies and collects relevant biological datasets for the sanctuary and combines these datasets in a GIS framework. This assessment is being used in the revision of the Joint Management Plan for MBNMS, GFNMS, and CBNMS (see citation below).

> NOAA National Centers for Coastal Ocean Science (NCCOS) 2003. *A Biogeographic Assessment off North/Central California: To Support the Joint Management Plan Review for Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries: Phase I - Marine Fishes, Birds and Mammals.* Prepared by NCCOS's Biogeography Team in cooperation with the National Marine Sanctuary Program. Silver Spring, MD 145 pp. Also available on CD-ROM and on-line. http://ccma.nos.noaa.gov/products/biogeography/canms_cd/index.htm

HABs: This project is developing methods for applying satellite imagery to the study and monitoring of HABs and other algal blooms in sanctuaries. Methods will be developed

to extract water depths from satellite images at different spatial resolutions for use in a variety of applications, including biogeographic characterizations. Water depth information is required to characterize shallow marine regions at global to local scales, particularly for those habitats with complicated morphology, such as coral reefs. Mapping shallow water depths at coarser scales can improve reef location information, while mapping at fine scales can improve reef characterization. The availability of data from a variety of satellite sensors, with a range of spatial resolutions, provides a capability to examine and map shallow water habitat at all these scales. A new method has been developed to simplify depth determination in clear water from satellite data. This method efficiently provides detail on bottom structure independent of variations in bottom cover, and can be applied to multi-spectral satellite sensors such as SeaWiFS (Sea-viewing Wide Field-of-view Sensor), Landsat, & IKONOS, as well as to digital photography from the International Space Station.

Environmental Stressors: This project will characterize environmental stressors in Central California National Marine Sanctuaries. This on-going research project is assessing the benthic communities, sediment toxicity and physical and ecological processes of the central California coast, contrasting the continental slope and canyon benthic habitats and biological communities. Assess contaminant fate and effects on benthic communities. See link for more details. http://ccma.nos.noaa.gov/cit/assessments/ac_dist_cont.html

4. Management Update

The Office of National Marine Sanctuaries is preparing the Draft Management Plans and Environmental Impact Statement for Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries after nearly three years of public input, issue prioritization, and recommendations from each site's Sanctuary Advisory Councils. This includes a review of resource protection, education and research programs, the program's resource and staffing needs, as well as the regulatory goals and sanctuary boundaries.

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